

WHAT IS CLAIMED IS:

1. An electron microscope comprising:

an electron beam source for emitting an electron beam;

5 an energy filter having an energy dispersion section for dispersing the electron beam according to electron energies, and a slit for selecting the electron beam dispersed by the energy dispersion section;

an objective lens; and

an energy filter electron beam detector for detecting an amount of the
10 electron beam selected by the energy filter,

wherein the energy dispersion section is adapted selectively to turn on and off, the slit is disposed in a trajectory of the electron beam dispersed by the energy dispersion section and the electron beam bypasses the slit when the energy dispersion section is turned off.

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2. The electron microscope according to claim 1 further comprising an energy filter control unit, wherein the energy filter control unit is able to adjust one of the trajectory of electron beam and a position of the slit according to a signal, which is generated as a result of shifting an area on the slit
20 illuminated by the electron beam and detected by the energy filter electron beam detector, while the energy dispersion section is turned on.

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3. The electron microscope according to claim 1 wherein the energy filter is disposed between the electron beam source and a specimen or downstream the specimen relative to a direction of traveling of the electron beam, and the electron beam selected by the energy filter is employed for observing the

specimen.

4. An electron microscope comprising:

an electron beam source for emitting an electron beam;

5 an energy filter having an energy dispersion section for dispersing the electron beam according to electron energies, and a slit for selecting the electron beam dispersed by the energy dispersion section;

an objective lens; and

an energy filter electron beam detector for detecting an amount of the electron beam selected by the energy filter,

10 wherein the electron microscope further comprises an energy filter control unit which is able to adjust one of the trajectory of electron beam and a position of the slit according to a signal, which is generated as a result of shifting an area on the slit illuminated by the electron beam and detected by the energy filter electron beam detector.

5. The electron microscope according to claim 4 wherein the energy filter control unit comprises:

20 a shifting controller for shifting a position of the electron beam on the slit;

a signal analyzer for analyzing the position of the electron beam on the slit based on output signals delivered by the shifting controller and energy filter electron beam detector; and

25 a deflection coil controller for controlling an energy filter deflection coil which controls positions of the electron beam at an entrance and an exit of the energy filter.

6. An electron microscope comprising:

an electron beam source for emitting an electron beam;

an energy filter having an energy dispersion section for dispersing the
5 electron beam according to electron energies, and a slit for selecting the
electron beam dispersed by the energy dispersion section;

an objective lens; and

a secondary electron detector for detecting an amount of secondary
electrons emitted by a specimen illuminated by the electron beam,

10 wherein the energy dispersion section is adapted selectively to turn on
and off and the electron microscope comprises an energy filter control unit
which cyclically shifts an area on the slit illuminated by the electron beam
while the energy dispersion section is turned on, thereby pinpointing the area
based on signals delivered by the secondary electron detector, so that one of a
15 trajectory of the electron beam and a position of the slit can be adjusted.

7. The electron microscope according to claim 6 further comprising a
deflection coil for correcting the trajectory of the electron beam coming through
an exit of the energy filter, and wherein the energy filter electron beam
20 detector is adapted to dispose downstream the exit relative to a direction of
traveling of the electron beam so that the energy filter electron beam detector
does not intercept the trajectory of the electron beam.

8. A method for adjusting an electron microscope for observation of a
25 specimen, the steps of the method comprising:

carrying out dispersion with an energy dispersion section according to

electron energies for an electron beam before the electron beam illuminates the specimen or after the electron beam transmits through the specimen

selecting the post-dispersion electron beam with an energy filter having a slit including at least two shields;

5 employing the electron beam selected with the energy filter for the observation of the specimen,

wherein the method further comprises:

repeating shifting of a position of the selected electron beam on the slit at least once from a first position where the selected electron beam is intercepted by a first shield, via an opening of the slit, to a second position
10 where the selected electron beam is intercepted again by a second shield;

detecting the intensity of an electron beam passing through the slit as a result of a previous step; and

controlling the position of the electron beam on the slit according to
15 change in the intensity.

9. The method according to claim 8 wherein the method further comprises:

shifting one of each shield and the whole slit back and forth at least
20 once;

detecting the intensity of an electron beam passing through the opening of the slit corresponding to displacement of the slit; and

controlling the position of the electron beam on the slit according to the displacement of the slit and a change in the intensity of the electron beam.

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10. The method according to claim 8 wherein the method further comprises:

shifting an area illuminated by an electron beam by a larger distance than a width of the opening of the slit;

detecting the intensity of the electron beam passing through the opening of the slit corresponding to displacement of the electron beam; and

5 controlling the position of the electron beam on the slit according to the displacement of the electron beam and a change in the intensity of the electron beam.